ASPHALTIC JOINTING COMPOUNDS

TABLES

Showing the quantities of jute and asphaltic compounds of various brands required to make a proper joint for any diameter of A.S.T.M. Vitrified Salt Glazed Clay Sewer Pipe

This bulletin is issued in a spirit of co-operation for the guidance of engineers, contractors, plumbers and all who have to do with the installation of vitrified clay pipe. If it helps you it has served its purpose

CLAY PRODUCTS ASSOCIATION
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What Jointing Compound Should You Use?

DUE to numerous requests for information regarding asphaltic compounds for jointing vitrified salt glazed clay sewer pipe, the following tables have been prepared from information generously furnished by the manufacturers of these materials. We offer no suggestions as to which particular brand will provide the best joint, because any of them will prove satisfactory if proper workmanship and care are maintained in making the joints throughout the entire system.

The following tables, which show the quantity of the various kinds of jointing compounds and jute required per joint of the different sizes of vitrified clay pipe, are intended to furnish additional information from which the cost of joints for any size system may be more closely estimated.

Several factors were taken into account in determining the desired depth of a joint for each size of pipe, namely, flexibility of the joint, adhesion between the pipe and the compound, and the amount of internal and external pressure which the joint will withstand. It is not to be supposed that jointing compounds shown on the accompanying tables are equal so far as adhesiveness and flexibility are concerned, but for both hot poured and plastic joints we would recommend a minimum depth of compound joint of one inch, while for those compounds which have relatively lower adhesion probably a deeper joint is advisable. However, for the sake of comparison, a uniform depth of joint for each size of pipe has been used throughout the tables.

The recommendations outlined in the tables are based on standard practice and are not those of any particular sewer jointing compound manufacturer.

Acknowledgment is made to the manufacturers of jointing compounds as listed below for the assistance and co-operation extended the Clay Products Association in supplying specific data concerning their product. For information regarding any particular brand of compound, or for prices of these materials, we refer you to the manufacturers.

TRADE NAME	MANUFACTURER	ADDRESS
Ex-X1-Cell	Cochrane Chemical Co.	432 Danforth St., Jersey City, N. J.
Genasco	Barber Asphalt Co.	1600 Arch St., Philadelphia, Pa.
G-K Compound	Atlas Mineral Prod. Co.	Mertztown, Pa.
Jointite	Pacific Flush Tank Co.	4241 Ravenswood Ave., Chicago, Ill.
Kalktite	Presstite Engineering Co.	4067 Park Avenue, St. Louis, Mo.
Korite	Standard Oil Company	910 S. Michigan Ave., Chicago, Ill.
Permaseal	Berry Asphalt Co.	1427 W. 76th St., Chicago, Ill.
Plastico	Stone, Brick & Block Wks. Inc.	101 E. 63rd St., Chicago, Ill.
PuroSeal	Pure Asphalt Prod. Co.	New Market, N. J.
Ric-Wil	The Ric-Wil Co.	Union Trust Bldg., Cleveland, Ohio
Ru-ber-oid	The Ruberoid Co.	95 Madison Ave., New York, N. Y.
Servicised	Servicised Prod. Corp.	6051 W. 65th St., Chicago, Ill.
Tufflex	Servicised Prod. Corp.	6051 W. 65th St., Chicago, Ill.

Types of Compounds

There are two kinds of asphaltic jointing compounds. One is commonly known as "hot poured" jointing material while the other is a plastic material. The hot compounds are usually mixtures and the ingredients vary according to the manufacturers. Some compounds are mixtures of petroleum asphalt and mineral filler. These fillers may be either powdered silica, ground limestone, carbon-black, or some other mineral. Others do not contain the mineral filler, but have rubber or some additional ingredients (known only to the manufacturer) added to the asphalt. These compounds are used when heated to approximately 350 degrees Fahrenheit, and are poured similar to the manner of placing a lead joint. They cool quickly after being poured and become solid.

The plastic compounds are commonly composed of liquid asphalt, which, when mixed with a mineral filler or fiber, or both, forms a plastic compound of the consistency of putty. This mixing is usually done on the job in quantities as needed. The compound is placed in the sewer pipe joint with a trowel or by hand, using a rubber glove for protection. These plastic materials begin to set immediately after mixing, although the subsequent setting action is slow.

Qualities of Jointing Materials

A successful joint is dependent on the nature of the compound and for that reason jointing materials should have the following qualities:

1. It should adhere (stick fast) to cold, wet, vitrified clay sewer pipe. To prevent leakage and infiltration it should form a tight joint even if two or three inches of water is present in the bottom of a sewer trench.
2. It should be dense (hard to penetrate) and free from bubbles so as to resist root growth and root penetration.
3. It should be chemically inactive, thereby being resistant to the action of acids, alkalies and solvents found in sewage.
4. Because some settlement or movement of the pipe may occur after the backfilling is placed upon it, the joint should be elastic so that such movement will not form cracks and break the bond. The material should be cohesive (that is, able to stick together) as well as adhesive (that is, stick to the pipe).
5. It should set quickly so that backfilling may be promptly completed without risk of distorting the joints.
6. It should be strong enough to permit assembly of some joints outside of the trench and it should be able to resist as much hydrostatic pressure (water pressure) as the clay pipe itself. Vitrified clay sewer pipe will withstand a hydrostatic pressure of 15 pounds per square inch for 15 minutes without leaking.
7. It should contain no filler which might settle out.

Method of Making Joints

Although the quality of a compound is essential to a perfect joint, it is quite evident that no matter how satisfactory a compound, improper application may result in failure. Incorrect instruction about jointing has frequently been given, and some compounds have been used that have properties unsuitable for this purpose.

Satisfactory joints can be obtained by:

(a) Proper application

(b) Selection of compounds most suitable for jointing

The principal factors in application are:

1. Caulking and alignment of pipe
2. Care and skill in pouring
3. Surface condition of pipe — wet, dirty and primed
4. Temperature of compound
5. Climatic conditions

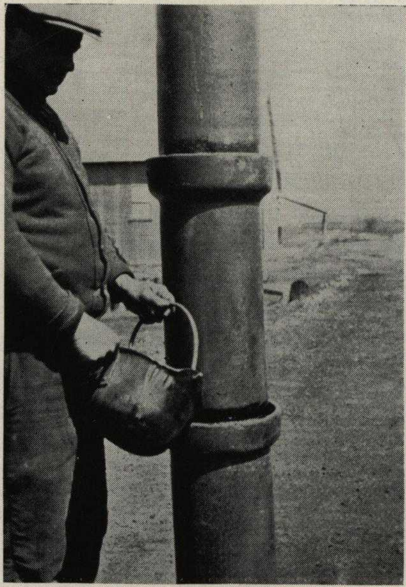
(Continued on page 4)

Method of Making Joints—*Continued*

EXPERIMENTAL investigations have proved conclusively that perfectly tight joints are readily obtained in two sections poured outside of the trench, with the pipe in a vertical position. Here the joint is most accessible, caulking and alignment is easier, the compound can be poured more readily, and defective joints can be easily detected.

To join pipes in a horizontal position, it is customary to use some fibrous material such as dry, unsaturated jute, hemp or asbestos for caulking and lining up the pipe. This caulking material should be packed firmly and evenly in place to permit the compound to have the greatest unobstructed surface for good pouring and adhesion. Care should be exercised in placing the runner or snake to assure nonleakage during pouring, and it should not be removed until the compound is sufficiently cooled to be permanently set.

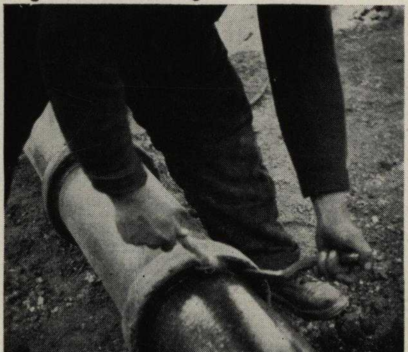
The manner of pouring a joint is of utmost importance. The compound should be poured continuously until the joint is completely filled, and this should be done as rapidly as possible. Slow and intermittent pouring gives poor adhesion, and non-uniform results. The void (empty space) from contraction of the compound should be filled while the compound is still warm.



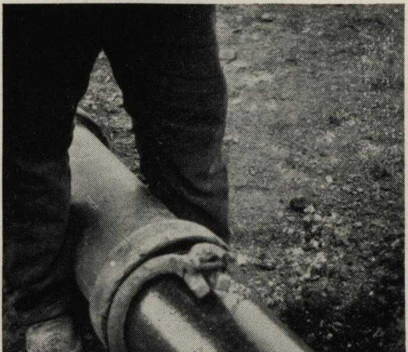
Pouring joints on the bank

Probably no other factor has so much importance as the surface condition of the pipe in affecting the results obtained. The pipe should preferably be dry and clean. Some bituminous (asphaltic) materials of desirable physical properties for jointing will adhere to wet, dirty pipe, and give a perfectly tight joint, but good work calls for clean pipe. The adhesion of the compound may be materially affected by the temperature of the pipe; generally speaking, the colder the pipe, the poorer the adhesion. Some pipe layers insist that the bell and spigot ends should always be primed with a thin penetrating bituminous material to increase adhesion. This is particularly true when the temperature is under 50 degrees F., and when the pipe is dirty and wet. Some manufacturers of jointing compound advise against the use of primers, and state their best results were obtained if the bell and spigot were wiped out with a rag saturated with kerosene.

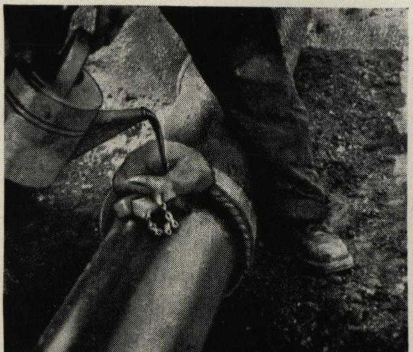
The pouring temperature of the compound should be between 350-450 degrees F. In cold weather the higher limit should be used, and in warm weather the lower. Many bituminous compounds change in physical properties under prolonged heat, so care should be exercised not to overheat or subject the compound to unnecessary prolonged heat.



Yarning the pipes to be jointed in the trench



Runner in position



Pouring joint in the trench

Practical Tests for Jointing Compounds

ADHESION is one of the most important qualities which any jointing compound must possess. If it is jointing compound for sewer pipe it is the adhesion of the bituminous material to the salt glazed surface of the pipe which prevents root growth, keeps ground water and sand out of the sewer, and prevents any contamination of the surrounding soil. The following test is both simple and accurate:

FIRST: Sufficient jointing compound is melted in the bottom of a pie tin to form a layer between ⅛ and ¼ of an inch thick.

SECOND: A few ordinary glass marbles are dropped into the pan containing the melted jointing compound.

THIRD: The pan is then placed in an oven or over a very low fire for fifteen or twenty minutes. Care must be taken that the marbles do not turn and that the jointing compound does not go above 450 degrees F.

FOURTH: The pan with the compound and marbles is allowed to cool and the marbles are tested to see if they are all tight.

FIFTH: If all of the marbles are tight at this point of the test the pan is filled with water and allowed to soak for ½ to 2 hours.

SIXTH: At the end of this soaking the water is emptied from the pan; a cloth is used to dry the surface of the compound; and then the marbles are tested to see if they are tight or if any water will squeeze up around the marbles. If they are tight the soaking is continued; the material is considered satisfactory if the marbles do not loosen after a soaking period of 48 hours.

Low viscosity (fluidity) for rapid and easy pouring, minimum settling of the filler, if a filler is used, and resistance to prolonged heating are also items for consideration. These properties must be associated with such other properties as plasticity (capability of being moulded) at low assembly temperatures, and sufficient mechanical strength to withstand handling of assembled sections outside of the trench at high assembly temperatures. Compounds are on the market that are sufficiently strong to comply amply with service stresses, whether from hydrostatic, heat, or contraction and expansion.

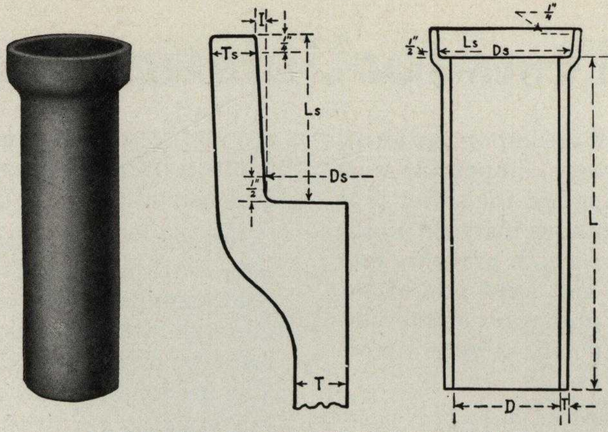
Experiments conducted at the University of Illinois indicate generally that adhesion decreases as the bituminous compound becomes harder and that mineral fillers decrease the adhesive value of the bituminous compound to which the filler is added. The hardness should be just sufficient to withstand the stresses required in handling the assembled sections, since the pipe is to give service where physical changes are reduced to a minimum from temperature changes. The fallacy of using an eye test so frequently pictured, such as several men standing on 3 or 4 sections joined together, is evident. Any hard compound will readily stand such usage, but it is not necessary, and frequently other desirable properties have been sacrificed to gain such an end. This test should include a time limit that would indicate sag under certain loads, so that mechanical strength would be just sufficient for handling, and the resulting stresses would not cause deformation for the time limit allotted for handling.

The abusive heating that compounds are subjected to before pouring calls for materials that show little change in physical properties. Here a constant source of trouble is the setting and caking of the filler and subsequent coking of the compound. Because of the troubles with compounds containing mineral fillers, many users prefer a compound which contains no filler. If some settling occurs this should show minimum tendency toward forming a compact cake, so that it can be readily stirred again. The dispersion (mixing) should be thorough to give a lump and bubble free compound. The fillers should be unaffected by weak acids and alkalies.

Prevention of Root Growth

The elimination of the growth of tree roots into sewers depends more upon the method of installing an asphalt joint than upon the quality of the jointing medium. No difficulty has been experienced in laboratories in making perfect joints which can and do withstand root growth, but when the same materials are used in the field by the average workman, carelessness often creeps in and trouble results.

The annular space at each joint must be entirely filled, for if there exists a fissure in the compound or a blow hole due to impounded air there is likelihood that roots in seeking moisture will penetrate the sewer through the fissure or blow hole. Asphalt has a toxic effect on root growth and there are few, if any, examples where roots have penetrated a solid layer of asphalt. Roots exude carbonic gas which will dissolve materials the base of which is limestone and for that reason cement joints have failed and allowed the roots to grow through the joints. Asphalts are inert to the action of acids and alkalies as found in soils and for that reason have given good results.



A.S.T.M. STANDARD SPECIFICATIONS C-13-35

TABLE No. 1

Dimensions of Vitrified Salt Glazed Clay Sewer Pipe

A.S.T.M. STANDARD

INTERNAL DIAM. INCHES	APPROX. WGT. PER FOOT POUNDS	PERMISSIBLE LAYING LENGTH FEET	INSIDE DIAM. AT ½" ABOVE BASE OF SOCKET—INCHES	ANNULAR SPACE INCHES	THICKNESS OF BARREL INCHES	DEPTH OF SOCKET INCHES
4	9	2	5¾	⅜	½	1¾
6	15	2, 2½	8¼	½	⅝	2¼
8	24	2, 2½, 3	10½	½	¾	2½
10	33	2, 2½, 3	12¾	½	⅞	2½
12	45	2, 2½, 3	15⅛	9/16	1	2¾
15	75	2, 2½, 3	18¾	⅝	1¼	2¾
18	105	2, 2½, 3	22¼	⅝	1½	3
21	140	2, 2½, 3	25⅞	11/16	1¾	3¼
24	180	2, 2½, 3	29⅜	11/16	2	3⅜
27	245	2½, 3	33⅛	13/16	2¼	3½
30	300	2½, 3	36⅝	13/16	2½	3½
33	355	2½, 3	40	⅞	2⅝	4
36	395	2½, 3	43¼	⅞	2¾	4

TABLE No. 2

Amount of Jute Per Joint

INTERNAL DIAM. PIPE—INCHES	DEPTH — INCHES			VOLUME	CU. INCHES	WEIGHT—LBS.
	SOCKET	JUTE	COMPOUND	JUTE	COMPOUND	JUTE 25 Lbs. per Cu. Ft.
4	1¾	¾	1	5.1	7.0	.074
6	2¼	1¼	1	16.2	13.8	.234
8	2½	1½	1	25.2	18.2	.365
10	2½	1½	1	30.9	22.3	.447
12	2¾	1¾	1	48.9	29.9	.707
15	2¾	1¼	1½	47.0	60.0	.680
18	3	1½	1½	67.6	72.9	.978
21	3¼	1¾	1½	101.2	93.8	1.464
24	3⅜	1⅞	1½	123.9	107.7	1.793
27	3½	1½	2	130.3	185.8	1.885
30	3½	1½	2	144.4	205.9	2.089
33	4	1½	2½	170.0	304.3	2.457
36	4	1½	2½	184.1	329.5	2.662

NOTE: Weight of dry, unsaturated, caulked jute, 25 lbs. per cu. foot.

TABLE No. 3

Amount of Jointing Compound in Pounds Per Joint

HOT POURED JOINTS

INTERNAL DIAM. OF PIPE—INCHES	TRADE NAME AND WEIGHT PER CU. FT. OF COMPOUND				
	KORITE 62 Lbs.	PERMASEAL 64 Lbs.	GENASCO 75 Lbs.	SERVICISED Approx. 75 Lbs.	G-K COMPOUND 90 Lbs.
4	.30	.31	.36	.36	.44
6	.59	.61	.71	.71	.86
8	.78	.80	.95	.95	1.13
10	.96	.98	1.15	1.15	1.39
12	1.28	1.32	1.55	1.55	1.86
15	2.58	2.66	3.12	3.12	3.74
18	3.14	3.24	3.79	3.79	4.56
21	4.04	4.18	4.88	4.88	5.86
24	4.63	4.78	5.60	5.60	6.73
27	8.00	8.25	9.67	9.67	11.61
30	8.86	9.15	10.72	10.72	12.86
33	13.10	13.52	15.85	15.85	19.02
36	14.18	14.64	17.16	17.16	20.59

NOTE: 20 per cent of compound included in this table for possible wastage.

TABLE No. 4

Amount of Jointing Compound in Pounds Per Joint

HOT POURED JOINTS

INTERNAL DIAM. OF PIPE—INCHES	TRADE NAME AND WEIGHT PER CU. FOOT OF COMPOUND				
	EX-XL-CELL 91.25 Lbs.	RIC-WIL Approx. 91.5 Lbs.	RUBER-OID Approx. 100 Lbs.	PURO-SEAL 100 Lbs.	JOINTITE 102 Lbs.
4	.44	.44	.49	.49	.50
6	.86	.87	.95	.95	.97
8	1.15	1.16	1.26	1.26	1.28
10	1.40	1.42	1.55	1.55	1.57
12	1.88	1.90	2.08	2.08	2.15
15	3.79	3.80	4.16	4.16	4.24
18	4.61	4.63	5.06	5.06	5.16
21	5.91	5.99	6.51	6.51	6.64
24	6.82	6.84	7.47	7.47	7.63
27	11.77	11.80	12.90	12.90	13.16
30	13.04	13.08	14.29	14.29	14.58
33	19.28	19.33	21.13	21.13	21.55
36	20.88	20.94	22.88	22.88	23.32

NOTE: 20 per cent of compound included in this table for possible wastage.

TABLE No. 5

Amount of Jointing Compound in Pounds Per Joint

PLASTIC JOINTS

INTERNAL DIAM. OF PIPE—INCHES	TRADE NAME AND WEIGHT PER CU. FOOT OF COMPOUND		
	KALKTITE 82.5 Lbs.	PLASTICO 85 Lbs.	TUFFLEX Approx. 85 Lbs.
4	.40	.41	.41
6	.79	.80	.80
8	1.04	1.07	1.07
10	1.27	1.30	1.30
12	1.70	1.76	1.76
15	3.43	3.53	3.53
18	4.17	4.30	4.30
21	5.37	5.53	5.53
24	6.16	6.36	6.36
27	10.64	10.97	10.97
30	11.79	12.15	12.15
33	17.43	17.96	17.96
36	18.87	19.45	19.45

NOTE: 20 per cent of compound included in this table to allow for difference in manner of caulking.

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